CLIMATE CHANGE RISK, FIRM VALUE, AND FINANCIAL FLEXIBILITY: EVIDENCE FROM SRI LANKA

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Abstract

This study investigates the impact of Climate Change Risk (CCR) on Firm Value (FV) among listed companies in Sri Lanka, an emerging economy highly exposed to climate-related hazards. Specifically, it explores the moderating role of Financial Flexibility (FFL) in mitigating the effects of CCR on FV, recognising the growing importance of adaptive financial strategies in the face of environmental uncertainty. A quantitative approach was adopted, using panel data regression analysis based on secondary data collected from firms listed on the Colombo Stock Exchange (CSE) for the period 2019–2023. CCR was proxied by greenhouse gas emissions as a percentage of sales, while FV was measured using Tobin's Q. FFL was introduced as a moderating variable, with firm size, leverage, and profitability included as control variables. The data were analysed using STATA software. The results indicate that CCR does not have a statistically significant direct impact on FV. However, FFL significantly moderates the CCR–FV relationship, suggesting that firms with higher FFL are better positioned to manage climate-related disruptions. These findings highlight the strategic importance of financial resilience in mitigating environmental risks. For practitioners and policymakers, the study underscores the value of embedding FFL into corporate strategy as a buffer against long-term climate uncertainties. Future research should use larger, more diverse samples and include firm-specific variables like governance, innovation, and market position to improve external validity and deepen understanding of CCR and FFL impacts.

Keywords: Climate change risk, Colombo Stock Exchange, financial flexibility, firm value

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Introduction

Background of the study

One of the key challenges that has been a key agenda item of corporate board discussion is climate change and its potential impact on businesses. In the annual Global Risk Report 2024, the World Economic Forum (WEF) named extreme weather events, critical changes to earth systems, biodiversity loss, and ecosystem collapse as the top global challenges that require urgent action to combat them (WEF, 2024). In 2024, natural disasters and severe weather events cost USD 417 billion in losses to the global economy (WJS, 2024). Additionally, a report from the Carbon Disclosure Project (CDP) reveals that 83% of the world's cities report significant climate hazards, with over half experiencing flooding (58%) and extreme heat (54%). Approximately two-thirds of these cities expect these hazards to become more intense and frequent (CPD, 2024). These risk factors can also be considered factors that can impact business enterprises' financial performance and long-term sustainability (IPCC, 2021).

Institutional and ecological evolution related to climate change is increasing pressures on business enterprises since it can affect their future corporate and business strategies (Stern, 2007). On the one hand, companies are directly (e.g. those producing fossil fuel and electricity) and indirectly (e.g. those consuming fossil fuels and electricity) responsible for Green House Gases (GHGs) emissions (Gasbarro et al., 2017). In highlighting the impact of business enterprises on global climate change, Patenaude (2010) highlighted that the sum of the emissions of the world's biggest companies is equivalent to the annual emissive contribution of the European Union (EU). This also uncovered that there is a huge role to play by business enterprises in mitigation. Many of the extant academic studies highlighted that companies are affected by the impacts of climate change particularly due to ecological changes, e.g. weather and climate events (Liu et al., 2024; Linnenluecke et al., 2012; Linnenluecke & Griffiths, 2010).

These climate changes pose significant threats to developing countries with unstable social, economic, and political structures. Furthermore, it was revealed that the climate crisis disproportionately hits the poor, as the lowest-income countries produce one-tenth of emissions but are the most heavily impacted by climate change (WEF, 2023). Being a tropical island in the Indian Ocean, Sri Lanka has consistently been placed among the top ten countries at risk of extreme weather events by the Global Climate Risk Index (UN, 2023). Furthermore, Sri Lanka as an island country where significant industries such as agriculture, tourism, and fisheries are highly vulnerable to climate risks with heat, rising sea levels, floods, landslides, and droughts. Local environmental mismanagement has exacerbated these risks. Thus, the local businesses operating in this vulnerable environmental setting are also threatened by the potential impact these climate risks may have on them. There is a need to assess the potential impacts of these risks on firm value (FV).

Business entities operating in Sri Lanka have to face this climate change risk (CCR) quite frequently as the country has drastic climate changes over short periods. It may sometimes have hefty rain or a very hot climate. Further, as businesses in Sri Lanka do not have very advanced technology as foreign countries, they emit harmful gases a lot when conducting their business operations, which are harmful to the environment. As a small island and a developing nation, Sri Lanka is highly vulnerable to the adverse effects of climate change. Consequences of climate change, such as temperature rise, rainfall variability and sea level rise, are critically affecting almost all economic sectors of the country. Occurrences of natural disasters due to extreme weather conditions, such as prolonged droughts, flash floods and landslides, deprive lives and livelihoods of people (United Nations Framework Convention on Climate Change [UNFCCC], 2023).

Although Sri Lanka is considered a low-carbon-emitting country, producing only around 1.02 CO_2e tonnes per person (Ministry of Environment, 2023), the economic significance of climate change risk remains substantial. The country's industrial base relies heavily on non-renewable energy sources such as coal and diesel for electricity generation and industrial operations. Many firms also depend on diesel generators during power shortages and use fossil fuels for business transportation, collectively contributing to local GHG emissions and operational inefficiencies. These factors, coupled with frequent climate-related disruptions, directly influence firms' costs, profitability, and asset values. Therefore, Sri Lanka represents an ideal setting to examine how firms operating in low-emission, but high-vulnerability economies manage and adapt to climate risks. Moreover, its context provides unique insights into transition risks faced by emerging markets where financial flexibility is a critical determinant of resilience under limited regulatory enforcement and constrained access to green financing.

Research problem

Existing literature has examined the relationship between CCR and FV primarily in developed economies, where climate disclosures and environmental regulations are more advanced. However, limited attention has been paid to emerging economies such as Sri Lanka, which, despite being a low-carbon emitter, faces significant exposure to climate-related disruptions due to its geographic and economic vulnerabilities. Industries like agriculture,

tourism, and manufacturing, are directly impacted by extreme weather events, energy shortages, and rising operational costs. Moreover, many Sri Lankan firms operate under resource constraints and limited technological capacity, making them more sensitive to climate-induced risks.

At the same time, financial flexibility (FFL) is gaining recognition as a critical determinant of corporate resilience, enabling firms to absorb shocks and invest in adaptation strategies. Yet, the moderating role of FFL in the CCR–FV relationship remains empirically underexplored in developing contexts. Therefore, this study addresses the lack of evidence on how CCR influences FV and how FFL mitigates this impact within Sri Lanka's vulnerable and resource-constrained business environment.

Contribution of the study

This study makes several key contributions to theory and practice. First, it extends the empirical understanding of climate finance in emerging economies by analysing how CCR affects firm value in Sri Lanka, an under-researched, climate-vulnerable market with unique structural constraints. By doing so, the study enriches the global discourse that has so far been dominated by evidence from developed economies. Second, the study contributes to the theoretical integration of Agency Theory, Capital Structure Theory, and Stakeholder Theory by demonstrating how FFL functions as a strategic resource that mitigates the adverse effects of CCR on FV. This multidimensional theoretical approach offers a nuanced understanding of financial resilience in the context of environmental uncertainty. Third, it provides practical insights for corporate decision-makers and policymakers. For firms, the findings highlight the importance of maintaining adequate liquidity and financial flexibility as part of climate risk management strategies. For policymakers, the study underscores the need to promote financial and regulatory frameworks that encourage sustainable investment and enhance firms' adaptive capacity to climate change.

Overall, this research contributes to the growing body of literature linking environmental risk management and corporate finance by positioning financial flexibility as a critical mechanism through which firms in developing countries can sustain value in the face of climate uncertainty.

Literature Review

Theoretical review

Agency Theory (Jensen & Meckling, 1976) explains how conflicts between managers and shareholders affect long-term strategic decisions. Managers tend to prioritise short-term performance metrics, while shareholders seek sustainable value creation. Investments in climate mitigation and adaptation are often perceived as costly by managers, resulting in underinvestment in sustainability initiatives. Firms with greater FFL, however, can mitigate these agency conflicts, as ample liquidity and low leverage enable managers to allocate funds toward environmentally responsible projects without compromising immediate financial targets (Almeida et al., 2014). Capital Structure Theory (Modigliani & Miller, 1958) provides another important lens. It posits that firms' financing mix determines their ability to absorb risks and fund investment opportunities. In a climate risk context, highly leveraged firms may face financial distress when external shocks occur, whereas financially flexible firms with higher internal reserves and lower leverage can adapt more effectively to unpredictable climate disruptions (DeAngelo & DeAngelo, 2007; Myers, 1977). Stakeholder Theory (Freeman, 1984) further explains that firms that proactively manage environmental risks strengthen their legitimacy and stakeholder relationships, thereby enhancing FV. Clarkson et al. (2008) found that environmental performance and transparent climate-related disclosures improve firm reputation and reduce regulatory pressure. FFL supports this process by equipping firms with the resources to meet stakeholder expectations, especially during periods of environmental uncertainty (De Jong et al., 2012). Together, these perspectives highlight that CCR poses financial and strategic challenges, but the extent of its impact depends on how firms deploy financial flexibility to navigate environmental and market pressures.

Climate change risk and firm value

Empirical evidence on the effect of CCR on FV remains mixed. Some studies have demonstrated a negative relationship, suggesting that firms exposed to higher climate risks experience lower valuations due to increased operational costs, environmental penalties, and reputational damage. Chapple et al. (2013) and Park and Noh (2017) found that companies with GHG emissions or inadequate environmental strategies suffer valuation discounts. Similarly, Graff Zivin et al. (2018) observed adverse stock market reactions to climate-related events, reflecting investor concerns about exposure to regulatory and transition risks.

In contrast, other studies have identified neutral or positive effects, particularly when firms adopt proactive climate strategies. Wang et al. (2014) and Liu et al. (2018) report that firms integrating sustainability into operations can

attract investors who value environmental responsibility, potentially enhancing firm reputation and FV. These findings indicate that CCR's influence on FV depends heavily on firm-level governance, industry exposure, and national regulatory frameworks.

Moreover, the bulk of prior research has focused on developed economies with established emission reporting standards (Matsumura et al., 2014). Evidence from emerging economies, where climate policies and disclosure mechanisms are evolving, remains limited. Given Sri Lanka's high exposure to climate events and the increasing emphasis on environmental accountability, exploring this relationship in such a context provides valuable insights. Accordingly, the following hypothesis is developed.

H1: *Climate change risk (CCR) has a significant impact on firm value (FV).*

Financial flexibility and firm value

Financial flexibility represents a firm's capacity to access and reallocate financial resources efficiently to respond to unexpected shocks and opportunities (DeAngelo & DeAngelo, 2007). High financial flexibility typically results from strong liquidity positions, low debt ratios, and access to external financing. Firms possessing such flexibility can withstand economic downturns, fund innovation, and maintain investment levels even under adverse conditions (Yung et al., 2015).

Empirical evidence generally supports a positive association between FFL and FV. Campello et al. (2010) and Almeida et al. (2014) observed that financially flexible firms are more resilient during crises, sustaining investments that preserve or enhance firm value. Similarly, Bereżnicka (2024) noted that FFL enables firms to remain competitive by ensuring continuous investment during uncertainty. Erdogan (2020), however, found that the benefits of FFL can be limited in emerging markets, where firms face restricted access to capital markets and less efficient financial systems.

The literature thus indicates that while FFL enhances corporate resilience and long-term value, its influence is context dependent. In small and developing economies such as Sri Lanka, where firms often face financing constraints and economic volatility, understanding how FFL affects FV becomes especially relevant.

Financial flexibility as a moderator of the relationship between CCR and FV

Recent studies have begun to integrate FFL into climate finance research by examining its moderating role in the CCR–FV relationship. Naseer et al. (2024) demonstrated that firms with greater financial flexibility experience weaker negative effects of CCR on FV, as they can reallocate financial resources toward mitigation, compliance, or adaptation measures. Similarly, Huang and Chen (2021) found that financially flexible firms are more capable of investing in environmentally sustainable technologies, thereby reducing long-term exposure to climate risks. Teng et al. (2021) observed that FFL facilitates strategic decision-making during crises, enabling firms to maintain profitability and stability.

Conversely, firms with low financial flexibility may be unable to finance compliance costs, invest in resilience measures, or manage climate-related disruptions effectively. Bukalska and Pietrzak (2023) emphasize that FFL acts as a financial buffer, allowing firms to endure periods of uncertainty and regulatory change. The moderating effect of FFL has therefore gained increasing theoretical and empirical attention, though the evidence remains concentrated in developed economies.

In developing countries like Sri Lanka, where firms are typically more financially constrained and face volatile operating conditions, FFL may play an even stronger moderating role in the CCR–FV nexus. Thus, examining this relationship in such a context contributes to the broader understanding of financial resilience under environmental uncertainty. Based on this reasoning, the study proposes the following hypothesis.

H2: *Financial flexibility (FFL) significantly moderates the relationship between climate change risk (CCR) and firm value (FV).*

Research gap

The reviewed literature highlights three key patterns. First, while CCR is widely recognised as a driver of firm value, empirical findings are inconsistent ranging from negative to insignificant or positive effects depending on contextual and methodological differences. Second, FFL is generally associated with improved firm value, yet its role as a financial buffer against environmental risks has not been systematically examined in emerging economies. Third, most prior research has been conducted in developed countries with mature capital markets and strong climate disclosure mechanisms, leaving limited understanding of how firms in developing economies adapt financially to climate challenges.

This study contributes to closing this gap by examining the interplay between CCR, FFL, and FV among listed companies in Sri Lanka – an economy that, despite its low carbon emissions, remains highly vulnerable to climate-related hazards. The findings are expected to advance understanding of how financial flexibility can enhance firms' resilience to climate risks in contexts characterised by limited resources and regulatory support.

Methodology

Data and variables

This study employed secondary data, utilising publicly available information to conduct the analysis. Specifically, data were collected from the annual reports of the selected companies, which are published on the official website of the CSE. A balanced panel dataset spanning five years, from 2019 to 2023, was constructed for analysis. The collected data were analysed using panel regression techniques with the assistance of STATA statistical software. The population of this study comprises all 284 companies listed on the CSE in Sri Lanka as of 30th October 2024. Despite encompassing all 20 Global Industry Classification Standard (GICS) sectors represented on the CSE, the availability of sustainability reports and GHG emission disclosures was limited. Consequently, a purposive sample of 19 companies was selected from across the 20 GICS sectors based on the availability of relevant sustainability and GHG emission data, including disclosures under the three GHG scopes. The sample size was necessarily constrained to 19 companies due to the limited number of firms providing such disclosures in their annual reports.

Dependent variable

Firm Value: Firm value is used as the dependent variable, representing the market's overall assessment of a company's future profitability and growth potential. Following prior studies (e.g., Wang et al., 2014; Park & Noh, 2017), firm value is proxied by Tobin's Q, calculated as the ratio of the market value of equity plus total debt to total assets. Tobin's Q is widely recognised as a forward-looking measure that captures investors' perceptions of a firm's intangible assets, growth opportunities, and managerial performance, making it appropriate for evaluating how environmental and financial factors influence corporate valuation.

Independent variables

Climate Change Risk: CCR reflects the exposure of firms to transition and regulatory risks associated with greenhouse gas (GHG) emissions. In line with prior empirical work (Chapple et al., 2013; Matsumura et al., 2014; Liu et al., 2018), CCR is measured using GHG emission intensity, defined as the ratio of total GHG emissions to total sales revenue. This measure captures the emission burden relative to economic output, normalising for firm size and industry variation. GHG intensity is considered the most feasible and consistent proxy for CCR in Sri Lanka, where firm-level data availability is limited. It effectively represents the extent to which a firm's operations are carbon-intensive and thus exposed to potential transition risks from evolving environmental regulations and investor scrutiny.

Financial Flexibility: Financial flexibility is conceptualised as a firm's ability to access and deploy financial resources efficiently to manage unexpected shocks or investment opportunities. Following DeAngelo and DeAngelo (2007) and Almeida et al. (2014), FFL is measured through a composite approach combining two indicators: cash-to-assets ratio and leverage (debt-to-equity ratio). Firms with higher cash holdings and lower leverage are considered more financially flexible. To create a single indicator, standardised values of cash holdings and leverage (reverse-coded) were averaged, with higher values indicating greater financial flexibility.

Interaction Term: To test the moderating hypothesis, the interaction between CCR and FFL was included. This term captures whether the effect of climate risk on firm value varies depending on a firm's degree of financial flexibility.

Control variables

Several firm-specific and contextual variables were incorporated to account for alternative factors influencing firm value, consistent with prior research (Almeida et al., 2014; Erdogan, 2020; Teng et al., 2021).

Firm Size: Logarithm of total assets. Larger firms tend to have better access to capital markets and may benefit from economies of scale, influencing both CCR exposure and FV. Firm Age: Number of years since incorporation, controlling for firm maturity and experience effects. Profitability: ROA, representing a firm's operational efficiency. Leverage: Total debt divided by total equity, reflecting capital structure and risk level. Liquidity: Current ratio (current assets / current liabilities), capturing short-term financial stability. Sector Dummies: Industry-specific dummy variables control for heterogeneity in emission intensity and valuation patterns across sectors. Crisis Dummy: A binary variable equal to 1 for the years 2020–2023 (COVID-19 and economic crisis period) and 0 otherwise, to control for structural breaks affecting firm performance and valuation. These controls

ensure that the observed relationships between CCR, FFL, and FV are not confounded by firm heterogeneity, sectoral characteristics, or macroeconomic shocks.

Methodology and model specifications

This study adopts a positivist research philosophy, which emphasizes the use of measurement and logical reasoning, asserting that knowledge is derived from objective, observable, and quantifiable phenomena. Consistent with this paradigm, the study employs a deductive research approach, wherein the investigation begins with established theoretical frameworks and proceeds to empirically test these theories through systematic data collection and analysis. Accordingly, the study adopts a quantitative research methodology, as it aligns with the positivist stance and deductive reasoning by focusing on numerical data and statistical inference.

Model specifications

Below model shown is the regression model related to the regression type selected.

$FVit = i+t+\beta 1CCRit+\beta 2(FFLit)+\beta 3(CCR\times FFL)+\beta 4(FSit)+\beta 5(PRit)+\beta 6(LVit)+it$…… *(1)* Where, FV, CCR, FFL, CCR×FFL, FS, PR, LV denote Firm Value, Climate Change Risk, Financial Flexibility, Interaction Term, Firm Size, Profitability, Leverage respectively.

Empirical Results

The normality of the firm value (FV) variable was evaluated using the Shapiro–Wilk test, which indicated non-normal distribution ($p < 0.05$). Consequently, the FV variable was transformed into its logarithmic form to improve normality. Outliers in all study variables were examined through box plots, and except for firm size, all variables contained extreme values. These were treated using the winsorizing method to minimise the influence of outliers and ensure the robustness of subsequent analyses.

Summary statistics: Table 1 below summarises the descriptive analysis of the data set. The study consists of 95 observations with 19 companies and 5 time periods.

Table 1
Descriptive analysis.

Variables	Mean	Standard deviation	Minimum	Maximum
log_FV_w	-1.6516	1.2892	-4.7048	1.4256
CCR_w	.7440	.7253	0	2.2764
FFL_w	.5365	.2551	.02045	1.0260
FS	10.3585	1.5480	7.852	13.5205
PR_w	.15053	.1285	-.0324	.425
LV_w	.5419	0.2326	0.0847	.9870

(Source: Authors, based on survey results)

Variables such as the Log Value of FV, CCR, FS and LV have a greater variation between firms than within firms over time. This suggests that differences between firms in terms of size, financial structure, and profitability are more important than changes within firms over time. Variables such as the FFL, FS and LV show low within-group variation, suggesting that firms tend to maintain relatively stable financial characteristics over time. This could be a sign of long-term consistency in firm behaviour or strategy. Variables such as the CCR and Log Value of FV show substantial between-company variation, indicating that different firms have very different financial conditions. The PR variable shows moderate within-group variation, which could suggest that firms experience some fluctuations in profitability over time but are relatively stable across the sample. Conversely, FS appears highly stable within firms, which may indicate that firms do not frequently change in size or scale during the observed period.

Regression model

Given that this study incorporates a moderating variable, an interaction term was introduced between the independent variable, CCR, and the moderating variable, FFL. This interaction term, labelled as 'interaction,' was included before selecting the appropriate analysis model. Subsequently, both the Fixed Effect (FE) and Random Effect (RE) models were estimated separately. According to the Hausman test, the p-value for this study was 0.0247, which is below the 0.05 threshold. Consequently, the null hypothesis was rejected, indicating that the FE model was the more appropriate choice.

Following the selection of the FE model over the RE model, an additional step was required to confirm whether the FE model was preferable to the Pooled OLS model. To make this determination, an F-test was conducted. First, the Pooled OLS regression was estimated, followed by the FE regression. The F-test was then performed to compare the two models. Similar to the Hausman test, the null hypothesis in this case posited that the Pooled OLS model was more appropriate. To reject this hypothesis, the p-value needed to be below 0.05. Accordingly, the p-value obtained was 0.0001, which is well below 0.05. This result led to the rejection of the null hypothesis in favour of the alternative hypothesis, confirming that the FE model was the most suitable choice. Thus, based on the results of both the Hausman test and the F-test, the FE model was determined to be the most appropriate regression model for analysing this dataset.

Diagnostic tests

Time Fixed Effect: The Fixed Time Effect test is employed to identify if the dummies for all years are equal to zero. If so, no time fixed effects are required. However, the p-value of the test was significantly under 1%, indicating the acceptance of the null hypothesis. Accordingly, the premise that the coefficients for all the years are jointly equal to zero can be rejected. Therefore, the results depict that the model has to be included with time dummies.
Multicollinearity: To test multicollinearity, the correlation matrix was generated. Further, the Variance Inflation Factor (VIF) test was conducted. If the VIF values are greater than 10, it is said to have multicollinearity. According to the test output, the VIF values of all the variables, as well as the mean VIF value is less than 10, it was concluded that there is no multicollinearity exists in the variables.
Heteroskedasticity: The Wald test was used to check the heteroskedasticity. The Wald test output indicates the p-value at 0.0000, depicting heteroscedasticity. Accordingly, the robust standard error was included in the final regression model as the remedy for heteroscedasticity.
Final Regression Model Analysis: The FE model was employed for the final regression analysis. Additionally, time dummies and robust standard errors were incorporated to address identified issues.
Table 2 provides an overview of the applied model.

Table 2
Model overview

R-squared	0.5800
Prob > F	0.0000

(Source: Authors, based on survey results)

The within R-squared value indicates that 58.00% of the variation in firm value within companies is explained by the independent variables. This suggests a reasonable fit within companies, with a considerable portion of the variation in the dependent variable explained by the model. The between R-squared value indicates that only 5.88% of the variation between companies is explained by the model, indicating that most of the variation in firm value is within companies rather than across companies. The overall R-squared value suggests that overall, the model explains 8.27% of the total variation in firm value. Even though this is not a very high number it can be accepted as a moderate level. The p-value of the overall model is shown as 0.0000, which is statistically significant at 1% level. It indicates that at least one of the variables in the model has a statistically significant effect on firm value. Therefore, the overall model can be accepted as a good model.

The below Table 3 shows a summary of the coefficients and the p-values.

Table 3

Coefficients and significance of variables

Variable Name	Coefficient	Standard Error	P-Value
CCR	-0.1650	0.1152	0.169
FFL	0.0116	0.7433	0.988
interaction	0.7728	0.3386	**0.035
FS	-0.6092	0.4335	0.177
PR	1.4517	0.5454	**0.016
LV	1.4517	0.8849	0.193
Constant	3.4420	4.4599	0.450

(Source: Authors, based on survey results)

The following Table 4 shows the behaviour of the dependent variable, firm value on each year with compared to the baseline year, 2019.

Table 4
Coefficients and significance of year dummies

Year	Coefficient	Standard Error	P-Value
2020	-0.1811	0.0614	0.009
2021	0.4132	0.0935	0.000
2022	0.1847	0.1942	0.354
2023	0.4738	0.1903	0.023

(Source: Authors, based on survey results)

The negative coefficient suggests that firm value was lower in 2020 compared to the 2019 where this result is statistically significant. Next, 2021 shows a positive and statistically significant coefficient. It indicates that firm value was higher in 2021 than the baseline year, 2019. In 2022, the coefficient is positive; however, the effect is not statistically significant. Therefore, there is no significant evidence to show a significant change in firm value in 2022 relative to 2019. Moreover, in 2023, there is a positive and statistically significant coefficient. It suggests that the firm value was higher in 2023 compared to the baseline year, 2019.

Hypothesis testing

The hypotheses are developed as follows:

H1: *There is a significant impact of CCR on FV.*
Since the P-value of CCR was 0.169, the first hypothesis is not accepted. Therefore, there is no evidence to reject the null hypothesis, which says that there is no significant impact of CCR on FV has to be accepted. Hence, CCR does not impact on FV. There could be various reasons for rejecting this hypothesis; the small sample size, due to a lack of data availability, is the primary reason.

The second hypothesis of the study was,

H2: *There is a significant moderating effect of FFL on the relationship between FV and CCR.*
Since the P-value of the interaction term of CCR and FFL was 0.035 and it is significant, the second hypothesis can be accepted. Therefore, the null hypothesis is rejected. Hence, there is a moderating effect of FFL on the relationship between CCR and FV.

Findings and Discussion

The empirical findings reveal that CCR does not have a statistically significant direct impact on FV among listed companies in Sri Lanka, while FFL significantly moderates the CCR–FV relationship. These results provide both confirmation and divergence from prior literature and need to be understood within Sri Lanka's unique institutional and market environment.

The insignificant CCR–FV relationship contrasts with studies conducted in developed economies such as Park and Noh (2017) and Chapple et al. (2013), which found a negative association between CCR and FV, suggesting that firms with greater exposure to climate risk experience valuation penalties. In contrast, the present finding aligns more closely with Wang et al. (2014) and Liu et al. (2018), who reported that the link between CCR and FV can be weak or neutral when investors do not fully price environmental risks or when firms proactively manage sustainability initiatives. This inconsistency across contexts underscores the role of institutional maturity in shaping market responses to climate risk. In Sri Lanka, the limited enforcement of environmental reporting, the absence of carbon-pricing mechanisms, and the voluntary nature of ESG disclosures may prevent investors from incorporating CCR into valuation decisions. Consequently, climate risk remains a latent rather than a priced factor in the domestic equity market.

Investor sophistication also plays a decisive role. Unlike in advanced economies where institutional investors exert pressure for climate transparency, Sri Lanka's market is dominated by retail investors who focus on short-term returns and often lack awareness of environmental performance indicators. This behavioural tendency may explain why CCR is not statistically significant: market participants do not yet perceive climate exposure as material to firm performance. These findings therefore support the argument that in less developed financial systems, informational asymmetries and data gaps dilute the valuation relevance of CCR (Nguyen et al., 2020; Pradhan et al., 2024).

The significant moderating effect of FFL reinforces theoretical propositions derived from Agency Theory, Capital Structure Theory, and Stakeholder Theory. Consistent with De Angelo and De Angelo (2007) and Almeida et al. (2014), firms with higher financial flexibility possess greater internal capacity to respond to shocks, invest in adaptation measures, and sustain operations during environmental disruptions. This finding also mirrors Naseer et al. (2024), who demonstrated that FFL buffers the negative influence of CCR on FV in other emerging markets. The Sri Lankan evidence therefore, extends existing theory by confirming that even where climate risk is not fully priced by investors, FFL remains a key internal mechanism of resilience.

However, the strength of the moderating effect appears particularly pronounced in Sri Lanka because of contextual constraints. Access to external finance is limited, and the domestic capital market lacks diverse green financing instruments such as sustainability-linked bonds or credit facilities common in more mature economies. As a result, FFL becomes the primary means by which firms fund adaptation or efficiency projects. This observation is consistent with Erdogan (2020), who argued that financial flexibility yields disproportionately high value in emerging markets where external capital is scarce. It also complements Stakeholder Theory (Freeman, 1984), suggesting that financially flexible firms can meet stakeholder expectations for environmental responsibility without jeopardising short-term liquidity.

The findings further highlight how institutional weaknesses amplify the importance of internal financial capacity. Weak regulatory oversight, inconsistent climate disclosure standards, and unreliable firm-level data constrain the ability of both investors and regulators to assess environmental exposure. During data collection, only a small number of firms disclosed GHG emissions, and many provided partial or incomparable information. These reporting deficiencies likely contribute to the absence of a direct CCR–FV relationship and echo concerns raised in global studies regarding disclosure quality in frontier markets.

Overall, the study extends the literature by demonstrating that in markets characterised by low regulatory quality, limited investor sophistication, and disclosure gaps, CCR alone may not directly influence FV; instead, its financial consequences are mediated through firms' adaptive capacity and liquidity management. The Sri Lankan evidence therefore reinforces the notion that FFL functions as a context-specific resilience mechanism, bridging institutional shortcomings that delay the full integration of climate risk into market valuations. Strengthening mandatory disclosure frameworks, expanding sustainable-finance instruments, and enhancing investor awareness would likely narrow this gap and align future outcomes more closely with patterns observed in advanced economies.

Conclusion

This study aimed to explore the relationship between CCR and FV, with a particular focus on whether FFL moderates this relationship. A panel data set consisting of 19 companies and a time range of five years from 2019 to 2023 was considered. For the analysis, panel data regression was followed. The analysis used the FE regression model with robust standard errors to examine the impact of CCR on the FV and to examine the moderating effect of FFL on the relationship between CCR and the FV. The key findings from the regression model provide valuable insights into how firms' CCR and their ability to adapt financially influence FV. Further, three control variables, which are related to firm value, namely, FS, PR and LV, were considered. The overall model was considered significant and had a moderately high R-squared value. The independent variable, CCR did not show a statistically significant impact on the dependent variable of FV, while the interaction term FFL with the CCR showed that there is a statistically significant impact, and the relationship between CCR and FV is moderated by FFL. The control variables FS and LV did not have a significant impact on FV, while PR had a statistically significant impact on FV.

Implications: The findings from this study offer several key implications, particularly in the context of how CCR influences firm value and the potential role of FFL as a moderating factor. The study's findings show that CCR does not have a statistically significant direct effect on FV, challenging some of the existing literature, which suggests that firms exposed to climate-related risks may see a reduction in their market value. However, this result aligns with studies suggesting that investors may not yet fully price in climate risks or may view them as distant, uncertain, or insufficiently material to impact short-term valuations. The study suggests that FFL, even though not significantly affect FV directly, is playing a role in moderating the relationship between CCR and FV, with a statistically significant interaction term. This implies that firms with higher FFL may be better positioned to adapt to climate risks and possibly mitigate their negative impacts on market value.

Recommendations: During the data collection process for this study, it became evident that only a limited number of companies disclose climate risk information. The findings suggest that investors may not fully incorporate climate risks into firm valuations, possibly due to inconsistencies and a lack of transparency in climate risk disclosures. To address this issue, policymakers should prioritise strengthening corporate disclosure requirements,

particularly for industries highly exposed to climate change, such as energy, agriculture, and transportation. Moreover, the findings suggest that financial flexibility may be a key factor for firms to adapt to climate-related risks. Policymakers could consider providing incentives for firms to improve their financial flexibility and invest in climate adaptation by offering green financing options such as green bonds or green loans with favourable terms, or tax incentives for companies investing in climate-resilient infrastructure and sustainable practices.

Limitations: While this study offers valuable insights, it has certain limitations that should be addressed in future research. A limitation of this study is the small sample size, where the analysis is based on data from 95 observations across 19 companies, which could lead to concerns about the general applicability of the results. Further, sample of this size, particularly with such a small number of companies, may limit the statistical power to detect true relationships.

The above-mentioned limitation of a smaller sample size occurred because of the data limitations. Data on climate change risk, particularly firm-level data, is still relatively scarce, and the quality of available data can vary significantly across industries. In some cases, firms may not disclose relevant information on their exposure to climate risks, making it difficult to accurately assess and compare the effects of CCR on FV.

Another limitation was even though several relevant variables, such as FS, PR and LV were considered as control variables, there may still be unobserved factors that influence both FV and CCR, leading to omitted variable bias.

Suggestions for Future Research: Future studies should aim to include a larger sample of companies, expanding the analysis to multiple industries or even to global firms, to enhance the external validity of the results. Moreover, future studies should explore the role of additional control variables that could capture important firm-specific characteristics, such as corporate governance, innovation capacity, or market positioning, to spot the effects of CCR and FFL better.

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